THE PREDICTION OF ACADEMIC SUCCESS FOR TRANSFER STUDENTS FROM FLORIDA PUBLIC COMMUNITY COLLEGES TO THE UNIVERSITY OF FLORIDA

By

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This manuscript is dedicated
in loving memory to my parents,
Nathan Sitzman and Helen Sitzman.

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The increasing numbers of community college students transferring to senior colleges and universities has underscored the need to examine issues related to the academic performance of community college transfer students in senior institutions. This study examined the predictive value of eight variables believed to be related to the academic performance of Florida public community college transfer students to the University of Florida. The variables were: grade point average for community college freshman and sophomore years, Florida Twelfth Grade Test score or equivalent, community college of origin, size of community college of origin based on full-time equivalent enrollment, University of Florida upper-division college in which enrolled, age at beginning of junior year, marital status at beginning of junior year, and University of Florida local residence.

The subjects were 730 upper-division students at the University of Florida who transferred with junior standing directly from a Florida public community college during the first three quarters of the 1968-1969 Academic Year. In addition the subjects met one of the following criteria: (1) They received a baccalaureate degree within nine consecutive quarters (which included two summer quarters) from their quarter of entry; or (2) They were suspended from the University or withdrew while under academic probation during the same period of time.

The subjects were divided into four samples, two of males and two of females. The first sample of each sex was subjected to a discriminant function analysis using the BMD 07M program of the Biomedical Computer Program package. Equations were derived for predicting completion of a degree or academic withdrawal. The equations were cross-validated on the second sample of each sex to determine if the accuracy of prediction had been spuriously increased by chance factors.

Two of the predictive variables specified above, "community college of origin" and "University of Florida upper-division college in which enrolled" were not amenable to inclusion in the discriminant function analysis. The relationship of each of these variables to transfer student

academic performance was examined by a chi square test.

The prediction equations for both the males and the females indicated that the most powerful predictor of academic performance was grade point average earned prior to transfer. Step one of the discriminant function analysis, which classified the subjects on the basis of community college grade point average alone, correctly classified 63.6 per cent of the males and 63.8 per cent of the females. The multivariate equations correctly classified approximately 66 per cent of each sex, indicating that the gain in prediction accuracy by including the other variables was marginal.

A test for significance of the difference between two independent proportions, used to compare the differences in prediction accuracy between the discriminant function and cross-validation procedures, indicated that the accuracy of prediction did not appear to be spuriously increased by chance factors in the sampling procedure.

The chi square tests suggested that community college of origin appeared to be related to the academic performance of males but not to females. Conversely, University of Florida upper-division college of enrollment appeared to be related to the academic performance of females but not

of males. These findings should be regarded tentatively since only a limited number of community colleges and University of Florida upper-division colleges were included in the chi square analyses.

While these findings should be valuable to prospective transfer students and those who advise them, academic prediction is far from perfect. These findings should be used as an aid in decision making, not as a substitute for professional judgment.

CHAPTER I

INTRODUCTION

Student retention and withdrawal within American colleges and universities has been the subject of several investigations which were national in scope (NcNeeley, 1938; Iffert, 1958). Extensive reviews of the literature have been conducted by Summerskill (1962), Marsh (1966), and Cope (1968). The findings of these studies were summarized by Cope (1968) in the following statement:

> . . . most authorities would, it seems, agree with the conclusion that approximately 40 percent of the entering students never achieve a baccalaureate degree. An additional 20 percent do not graduate on schedule. They return to graduate later at the same college or transfer to another institution. (1968, p. 386)

These phenomena may become even more complex during the next decade due to the greater numbers of upper-division students who will be entering senior institutions as junior college transfer students. Bennett (1971) noted that national junior college enrollments between 1961 and 1970 increased by 192.1 per cent, from 748,619 students to

2,186,272 students. In the State University System of Florida, between 1963 and 1969, the number of junior college students transferring to upper-division study increased from 1,933 to 6,694, an increase of 240.6 per cent (Florida Board of Regents, 1971).

A review of the literature on junior college student characteristics was conducted by Cross (1968). She examined a variety of variables including academic characteristics, interests and personality characteristics, self-concept, reasons for attending college and reactions to college, and educational and occupational aspirations. She wrote:

> We must conclude that intellectual dimensions sharply differentiate junior college students, as a group, from senior college students. The junior college student is less able--on our present tests; he is less intellectually oriented--on our present measures; and he is less motivated to seek higher education--in our traditional colleges.

Studies that compared the academic performance of junior college transfer students with "native students," i.e., students whose collegiate experience was limited to a single institution, indicated that, as a group, the native students were more successful. Hills (1965a) reviewed the literature on junior college transfer students for a 36-year period, 1928-1964. He found that two-thirds of the studies which compared mean grade point averages of transfer students and native students showed that the native students excelled. Similar findings were obtained by Knoell and Medsker (1965) in a study of a national sample of junior college students who transferred to 43 senior institutions in 1960.

Walker (1969) studied the academic performance of 1,999 students admitted to the upper division of the University of Florida in the Fall Trimester, 1966. These included 805 native students, 921 transfer students from Florida public community colleges, and 273 transfer students from other sources. He reported:

> . . . a larger percentage of native students than transfer students made grade point averages of 2.0+ in the upper division . . . academic probations were less frequent for native students than for transfer students . . . a smaller percentage of native students than transfer students withdrew from school . . . a smaller percentage of native students than transfer students were suspended from school . . . a larger percentage of native students than transfer students had graduated by the end of the summer term of 1968. . . . (1969, p. 124)

These findings suggest that as larger numbers of junior college transfer students attend four-year institutions to complete their baccalaureate programs issues related to college student retention and withdrawal may become more complicated. The research cited above reveals that, as a group, junior college transfer students do not do as well as native students in their upper-division studies. There is a clear need to improve the ability to predict the academic performance of community college transfer students. This study attempted to identify the predictive variables which tended to differentiate between those transfer students from Florida public community colleges who were academically successful at the University of Florida and those who were not academically successful.

Need for the Study

In April, 1971, the State University System of Florida and the Florida Division of Community Colleges entered into an articulation agreement to facilitate an orderly interface between upper-division and lower-division institutions and to promote the success and general well-being of the transfer student. The agreement specified that any graduate of a state approved Florida public community college "will be admitted to junior standing within the University System," provided the student has completed a university parallel program and received the Associate in Arts degree. The Associate in Arts degree must meet certain requirements for minimum number of hours and nature of course work, and must be awarded on the basis of a grade point average of at least 2.0 on a 4.0 system for all courses attempted.

Providing uniform standards of eligibility for admission to junior standing in the state universities is not equivalent to providing a uniform chance of success in each university. Knoell and Medsker (1965) have stated:

> All or most junior college students could be successful in achieving their degree goals after transfer _if_ they would select four-year institutions and major fields which are appropriate to their ability and prior achievement. . . . However, a large number of students are transferring to inappropriate institutions, i.e., to colleges in which they have a very low probability of earning satisfactory grades and thus of achieving their baccalaureate degree objectives.

The continuing effort to promote the success and well-being of the community college transfer student must include the providing of information on the probability of his success at different four-year institutions. Counseling services at a community college would be of greater value to a potential transfer student in his academic planning if those services would go beyond outlining a program to assure his admission to a particular senior institution, by providing data on the student's probability of success at that institution. Predictive data on the success of Florida public community college transfer students at the University of Florida should provide a student considering this institution with an improved basis for intelligent choice and should contribute to greater student retention at this University.

Data on several variables, both intellective and non-intellective, which the literature suggests are related to academic performance are obtained routinely on all students applying for admission to the University of Florida. Studies by Walker (1969), McFaddin (1971), and Voyles (1971) have shown that transfer students, as a group, tend to be less successful than native students at the University of Florida. These findings were based on such indices as grade point averages, withdrawal rates, and progress toward graduation. At the present time, a systematic statistical analysis to identify the predictive variables most strongly related to Florida public community college transfer students' academic performance at the University of Florida has not been performed. This study provides such an analysis, and the data obtained should contribute to improving the chances of academic success for this group of students.

Statement of the Problem

The purposes of this study were as follows:

1. To evaluate the predictive value of certain factors available in student records at the University of Florida which the literature suggests may be related to the academic performance of community college transfer students.

2. To provide a weighted combination of the predictive variables which maximally differentiated between those transfer students from Florida public community colleges who succeeded in attaining their baccalaureate degrees at the University of Florida within a period of nine consecutive quarters from their quarter of entry, and those who were suspended from the University of Florida or who withdrew from the University while under academic probation, within the same period of time.

Limitations

1. This study was limited to transfer students from Florida's public community colleges who were accepted to junior standing into the upper division of the University of Florida during the first three quarters of the 1968-1969 Academic Year: the Fall Quarter, 1968, the Winter Quarter, 1969, and the Spring Quarter, 1969. Data from these students were collected for nine consecutive quarters, which included two summer quarters. Thus, students who entered the University in the Fall Quarter, 1968, were traced

through the Fall Quarter, 1970; students who entered in the Winter Quarter, 1969, were traced through the Winter Quarter, 1971; and students who entered in the Spring Quarter, 1969, were traced through the Spring Quarter, 1971.

2. This investigation was limited to predictive variables available in student records at the University of Florida. The specific variables investigated were grade point average for community college freshman and sophomore years, Florida Twelfth Grade Test scores or equivalent, community college of origin, size of community college based on full-time equivalent enrollment, University of Florida upper-division college in which enrolled, age at beginning of junior year, and University of Florida local residence. Certain other factors which may be considered as predictors of academic performance, such as measures of motivation and measures of personality, were not utilized in this study.
3. This study did not include any transfer students from Hillsborough Community College, Florida

Junior College at Jacksonville, South Florida Junior College, or Tallahassee Community College. The data search utilized to identify the population of students for this study indicated that no transfer students from South Florida Junior College or Tallahassee Community College enrolled at the University of Florida with junior standing during the first three quarters of the 1968-1969 Academic Year. The junior college codes in the University's records storage system for the 1968-1969 Academic Year did not include identifiers for the other two community colleges. Since Hillsborough Community college began operation in 1968-1969, it is unlikely that any students from this college were enrolled as juniors at the University. Some students from Florida Junior College at Jacksonville may have been enrolled as juniors at the University; however, such students could not be identified for this study.

4. This study excluded Florida public community college transfer students enrolled in the University of Florida's College of Pharmacy. This college required all its students to complete three years of study beyond the sophomore year

to complete the baccalaureate degree. The baccalaureate programs of the other colleges included in this study required only two years beyond the sophomore year with one exception; a three-year requirement applied to architecture majors in the College of Architecture and Fine Arts. However, all other five curricula in this college required only two-years beyond the sophomore year to complete the baccalaureate degree. Since the data available identified only college of enrollment and not major field of study, students from the College of Architecture and Fine Arts were not excluded.

Definitions

Academic performance--This term refers to maintaining satisfactory progress toward the completion of a baccalaureate degree. Academic performance was traced for a period of nine consecutive quarters from the students' quarter of entry to the University of Florida. It was evaluated against the dichotomous criterion of (1) graduation, or (2) suspension from the University or withdrawal from the University while under academic probation.

Community college--In this study the terms "community college," "junior college," and "community junior college" are used interchangeably. These terms refer to a post-secondary institution which is controlled or operated by a governing board, which offers a two-year university parallel program leading to the Associate in Arts degree, and which offers at least one of the following additional curricula: occupational education or continuing education.

Florida public community college--One of the 27 community colleges in the State of Florida supported by public funds and coordinated by the Division of Community Colleges of the Florida Department of Education. A listing of these institutions is provided in Table 1.

Florida Twelfth Grade Test Score--That score earned by a student on the ability and achievement battery administered to all high school seniors in the State of Florida. For students who did not take this battery, an equivalent score based on a conversion of a general ability test score such as the American College Test (ACT) or the Scholastic Aptitude Test (SAT) was used. Such conversions were developed from equivalency tables provided by the Board of University Examiners of the University of Florida, the agency that administers the Florida Twelfth Grade Testing Program.

Intellective factors--Those variables which measure prior academic achievement, such as grade point average; or which measure academic ability, aptitude, achievement, or some combination thereof, such as a test used to screen applicants for college. Intellective factors included in this study were grade point average for community college freshman and sophomore years and Florida Twelfth Grade Test Score or equivalent.

Non-intellective factors--Those variables for predicting academic performance not included in the term intellective factors. Non-intellective factors included in this study were community college of origin, size of community college based on full-time equivalent enrollment, University of Florida upper-division college in which enrolled, age at beginning of junior year, marital status at beginning of junior year, and University of Florida local residence.

Transfer student--A student admitted directly from a Florida public community college to the upper division of the University of Florida with junior standing. This definition excludes students from Florida public community colleges who transferred to the University of Florida as freshmen, sophomores, or seniors; and students who transferred to the University of Florida from institutions other than Florida public community colleges.

TABLE 1

FLORIDA PUBLIC COMMUNITY COLLEGES

College	Location	Counties Served	FTE Enrollment Fall 1968[a]
Brevard Community College	Cocoa	Brevard	3,597
Broward Community College	Fort Lauderdale	Broward	3,751
Central Florida Community College	Ocala	Marion, Citrus, and Levy	1,213
Chipola Junior College	Marianna	Jackson, Calhoun, Washington, and Holmes	1,173
Daytona Beach Community College	Daytona Beach	Volusia, Flagler	3,726
Edison Junior College	Fort Myers	Charlotte, Collier, and Lee	998
Florida Junior College at Jacksonville	Jacksonville	Duval, Nassau	5,524
Florida Keys Junior College	Key West	Monroe	418
Gulf Coast Community College	Panama City	Bay, Gulf	1,438

TABLE 1 (continued)

College	Location	Counties Served	FTE Enrollment Fall 1968[a]
Hillsborough Community College	Tampa	Hillsborough	1,083
Indian River Junior College	Fort Pierce	St. Lucie, Indian River, Martin, and Okeechobee	1,152
Lake City Community College	Lake City	Baker, Columbia, Dixie, Gilchrist, and Union	1,293
Lake-Sumter Community College	Leesburg	Lake, Sumter	686
Manatee Junior College	Bradenton	Manatee, Sarasota	2,092
Miami-Dade Junior College	Miami	Dade	18,376
North Florida Junior College	Madison	Madison, Hamilton, Jefferson, Lafayette, and Taylor	1,206
Okaloosa-Walton Junior College	Niceville	Okaloosa, Walton	1,507
Palm Beach Junior College	Lake Worth	Palm Beach	3,818
Pensacola Junior College	Pensacola	Escambia, Santa Rosa	4,956

TABLE 1 (continued)

College	Location	Counties Served	FTE Enrollment Fall 1968[a]
Polk Community College	Winter Haven	Polk	2,060
St. Johns River Junior College	Palatka	Putnam, Clay and St. Johns	964
St. Petersburg Junior College	St. Petersburg	Pinellas	7,451
Santa Fe Junior College	Gainesville	Alachua, Bradford	2,305
Seminole Junior College	Sanford	Seminole	1,406
South Florida Junior College	Avon Park	Highlands, Hardee	342
Tallahassee Community College	Tallahassee	Leon, Gadsden, and Wakulla	1,224
Valencia Community College	Orlando	Orange	1,260

Source: Division of Community Colleges

[a] Fall 1968 data are reported because the subjects for this study transferred to the University of Florida during the 1968-1969 Academic Year.

CHAPTER II

REVIEW OF THE LITERATURE

The issues which seem most significantly related to the problem investigated in this study are: (1) retention and withdrawal of the college student, (2) prediction of academic success, and (3) performance of the junior college transfer student. A review of the literature for each of these issues is presented in this chapter.

Retention and Withdrawal of the College Student

National retention and withdrawal rates for American college students have been reported at relatively constant levels for more than 30 years. One of the first major studies of this issue (McNeeley, 1938) examined the academic careers of 15,535 students who were beginning freshmen in 25 universities during the 1931-1932 academic year. After four years it was found that 62.1 per cent of these students had withdrawn without attaining a degree. Some students within this group subsequently re-enrolled in the same or another institution to complete their baccalaureate programs. It was reported that 45.2 per cent of the students never attained their baccalaureate degrees. A later study by Iffert (1958), based on a sample of approximately 13,700 students, reported similar findings. The persistence of a net withdrawal rate of about 40 per cent was noted by Summerskill (1962). He reviewed 35 studies which included data from hundreds of colleges and universities from 1913 through 1962 and observed that over the past several decades, on a nationwide basis, about 40 per cent of the college students graduated on schedule, and perhaps another 20 per cent graduated from some college at a later time.

Despite the similarity of the gross national data, a comparison of graduation and withdrawal rates from specific colleges and universities indicates that considerable institutional variance does exist. Furthermore, rates within specific institutions vary with the length of the reporting period. Summerskill (1962) reported institutional "attrition" rates that ranged from 12 to 82 per cent. Irvine (1965) stated that 34.7 per cent of the freshmen graduated within a four-year period from the University of Georgia, and in four more years another 10 per cent graduated. At the University of Illinois, 49.7 per cent of the freshmen who entered in the fall of 1952 graduated in four years, but after 10 years this rate rose to 69.1 per cent

(Eckland, 1964). Max (1969) reported that over a seven-year period the University of Wisconsin had a graduation rate of 50 per cent, whereas the City University of New York had a graduation rate of 71 per cent.

Type of institution and type of control appear to be related to differences in rates of retention and withdrawal. Cope (1968) reported that withdrawal rates are generally higher at state-supported institutions than at private institutions. This is illustrated by Iffert's (1958) finding that only 33 per cent of the students at publicly controlled institutions completed their baccalaureate degrees, whereas in privately controlled institutions the graduation rate was 48 per cent.

Another factor which contributes to the variance in these data is a lack of uniform definitions and procedures. Summerskill described this problem as follows:

> . . . "attrition rate" has been variously defined: for example, as the percentage of students lost to each of the separate academic divisions of a college; as the percentage of students lost to the college as a whole (disregarding transfers within the college); as the percentage of students lost to higher education as a whole. Furthermore, attrition rates have been computed on a graduated-in-four years basis; on a graduated-in-four years or still-enrolled basis; on a graduated-eventually basis. (1962, pp. 629-630)

Many studies have attempted to identify the reasons associated with withdrawal from college. McNeeley (1938) found that 45 per cent of the withdrawing students withdrew for causes unknown to the institutions. The known causes cited most often were failure in work and financial difficulties. Iffert (1958) asked dropouts to name the single most important reason for leaving, and found that the most frequently cited factors were poor grades, health and family, financial problems, dissatisfaction with the institution, and disciplinary actions.

Waller's (1964) review of the research over the last 40 years attributed one-third of withdrawals to academic reasons, one-third to financial reasons, and one-third to motivational factors. A similar conclusion was reached by Summerskill (1962) who cited motivational forces, academic factors, and financial difficulties as the leading causes. Angers (1961) grouped the causes of college withdrawals into three major categories: (1) vocational disorganization, (2) uncontrollable reasons, and (3) discouragement. The first group included students who came to college because of external pressures rather than intrinsic motivation. Students in the second group left college because of financial, family, or health problems. The "discouraged" group were those who did not maintain the level of academic performance required by the college.

Intellective variables have been cited by many investigators as a major factor in student withdrawal. Summerskill underscored the importance of these variables with the following statement:

> . . . the central requirement for a college degree is the successful completion of courses offered and prescribed by the college. At the core of the social and emotional complexities of the college situation there is a job of work for which the student must have sufficient prior training and sufficient ability. (1962, p. 634)

Iffert (1958) found that high school achievement had a definite relationship to college achievement. He stated that the withdrawal rate for men in 20 colleges and universities would have been reduced from 61.2 to 43.9 per cent if only applicants in the top fifth of their high school graduating classes had been accepted for admission. Summerskill (1962) found that the average secondary school grades of college dropouts were lower than those of graduates. High school average had the highest correlation with college graduation in a study by Irvine (1966a), and rank in high school graduating class had the second highest correlation with graduation. Zaccaria and Creaser (1971) reported that high school rank was significantly higher for graduates than for academic withdrawals.

Scholastic aptitude test scores are also related to retention and withdrawal. Summerskill (1962) reviewed 19 studies concerned with aptitude test scores and found that average test scores were higher for graduates than for dropouts in 16 of these investigations. Daniel (1967) found that students with high aptitude test scores were more likely to remain in college than students with low scores. Rossman and Kirk (1970) found significantly higher test scores for persisters in college than for academic withdrawals. A similar conclusion was reached by Hannah (1971). Sharp (1960) examined the relationships between years of high school study in English, social studies, natural sciences, and mathematics; Florida Twelfth Grade Test scores in these areas; and first year college grades. He found that placement test scores were important for college success but amount of study in each subject area was not. Studies by Barger and Hall (1965) and Williams (1966) indicated that when academic aptitude was controlled, socio-economic and personality variables failed to differentiate between dropouts and persisters.

Despite the demonstrated importance of intellective factors, these variables alone do not account for all withdrawals from college (McNeeley, 1938; Iffert, 1958; Summerskill, 1962; Marsh, 1966; Cope, 1968). In a study by

Little (1959), 52 per cent of the students who withdrew from the University of Wisconsin were in the top 30 per cent of academic aptitude. Furthermore, Little stated that if university admissions had been limited to the top 30 per cent on aptitude test scores, 21 per cent of the graduates would have been denied admission.

Motivational forces have been cited as a major influence in college withdrawal by Angers (1961), Summerskill (1962), Waller (1964), and Cope (1968). In discussing this issue, Summerskill stated that motivation is a very complex phenomenon, and we have not yet identified the specific motivational forces which are predictive of college success, nor do we know how to measure such motivations.

Personality and interpersonal variables have been investigated in a number of studies. Fisher (1966) found no significant personality differences between achievers and non-achievers at a New York community college. A similar finding at a large Midwestern university was reported by Dollar (1970). Personality and interpersonal factors did differentiate between dropouts and persisters in studies by Astin (1964) and Bayer (1968), but the differences were too small to be of practical significance.

Conversely, several studies reported significant personality differences between dropouts and persisters.

Grace (1957) found that "dependent-irresponsible" students were most likely to leave college, and that students who withdrew tended to have "high manifest anxiety." Brown (1960) reported that male "dropouts" tended to be "irresponsible" and "nonconforming," while female dropouts tended to be "withdrawn and depressed." Daniel (1967) concluded that among high aptitude students, as measured by the SCAT, those who withdrew were more "trustful and tolerant," less "perseverant and inquiring," more "energetic and vigorous" and more "calm" and "collected." Hannah (1971) found that students who withdrew appeared more "impulsive, complex, anxious and withdrawn, and less personally integrated" than students who persisted in college.

Financial difficulties were ranked third as a reason for leaving college in the survey conducted by Iffert (1958). He also found the median annual income of parents of non-graduating students to be significantly lower than the income of parents whose children graduated. Summerskill (1962) identified finances as one of the three most important factors affecting withdrawal from college in 16 of 21 studies. Angers (1961) and Waller (1964) also listed financial problems as one of the three major causes of withdrawal.

Several investigators have examined demographic and environmental factors. Studies of size of high school and size of home community have yielded varied results. Altman (1959) and Lins, Abell, and Hutchins (1966) reported no relationship between high school size and college performance. However, Shaw and Brown (1957) and Hoyt (1959) found that underachievers were more likely to come from smaller high schools and less populated areas. Panos and Astin (1968) stated that two environmental patterns within the college increased the probability of dropout. The first of these involved a high level of student competitiveness and limited opportunity for familiarity with the instructors. The second pattern included relatively severe grading practices, limited concern for the student, and severe policies toward student aggression.

While a considerable amount of data has been gathered on college student retention and withdrawal, much of the information available suffers from several important limitations. The first of these is a tendency toward oversimplification. Many studies examined only single variables. Other studies which examined several variables assumed that these variables could be treated as distinct, mutually exclusive entities. However, the literature indicates that the reasons for dropout are complicated and overlapping (Iffert, 1958; Farnsworth, 1959; Summerskill, 1962; Cope, 1968). A student who leaves college will probably do so for a variety of interrelated reasons.

A similar oversimplification exists in regard to sex differences. Cope (1968) stated that reported withdrawal rates did not differ substantially for men and women. He attributed this to a failure to differentiate between the sexes in many studies. Variations in male and female graduation and dropout rates have been reported in studies which provided separate data for males and females (Trent and Ruyle, 1965; Hill, 1966).

Another difficulty lies in the possible lack of validity in the reasons reported for dropping out (Marsh, 1966). The possibility of socially acceptable reasons rather than true feelings being reported was described by Slocum (1956). Hill (1966) stated that "spurious or irrelevant" reasons for withdrawal were given by approximately one-third of the students dismissed for academic reasons from the University of Texas. Goetz and Leach (1967) found that persisters and dropouts at the University of New Mexico had similar problems. These authors concluded that some unidentified factors must be the real reasons why some students with problems continued and others with the same problems withdrew. Similar findings were reported by Hackman and Dysinger (1970).

Despite these difficulties with the data, the fact remains that the withdrawal of students from American colleges and universities is a phenomenon of major proportions. Substantial numbers of students leave institutions of higher education in America each year, and the overall rate of withdrawal has not changed appreciably during the many years this problem has been studied. The consequences of this situation at the personal level have been described by Hannah (1969):

> Happiness about the future is counterbalanced by uncertainty about the future. Only about one-third of the leavers feel relieved or happy about going, or confident about their future performance. Only 6 percent feel strongly unconcerned, and 40 percent feel strong anxiety.

Prediction of Academic Success

Prediction of academic success in higher education has been described by several writers as perhaps the most intensively investigated topic in educational-psychological research (Fishman and Pasanella, 1960; Keenan and Holmes, 1970). A review of the literature by Harris (1940) included 328 studies. Garrett (1949) cited 194 studies in his review nearly a decade later. Fishman and Pasanella (1960) reviewed the 10 years of activity following Garrett's summary and located 580 studies. The time period encompassed by these reviews was 37 years, from 1921 to 1958, and 1,102 research investigations were included.

The research design in academic prediction has remained relatively consistent, except for refinements in statistical technique. The typical procedure has been to employ one or more predictive measures taken prior to college admission in an attempt to approximate a criterion measure taken after one or more terms of college attendance. The criterion measure most often used has been college grade point average (Harris, 1940; Garrett, 1949; Fishman and Pasanella, 1960; Fishman, 1962; Feder, 1965). The early studies used simple correlation techniques, but more recent investigations have utilized multivariance analyses such as multiple regression (Adkins, 1963; Irvine, 1966a; Sherron, 1970), discriminant function (Ivanoff, 1961; Cooper, 1964; Kennan and Holmes, 1970; McFaddin, 1971), and multivariate analysis of variance (Suddarth, 1971).

The relatively recent application of multivariate techniques has been accompanied by the use of non-intellective factors as predictors (Fishman, 1962; Stein, 1963; Lavin, 1965; Mayhew, 1965). The Rorschach, the Minnesota Multiphasic Personality Inventory (MMPI), and the Taylor Scale of Manifest Anxiety were employed in 26 studies with a median correlation of .22 with college grade point average

(Mayhew, 1965). The Brown-Holtzman Survey of Study Habits and Attitudes and similar but locally developed inventories of study procedures had a median correlation of .47 with freshman grades in 25 studies (Fishman and Pasanella, 1960). Fishman and Pasanella also reported seven studies using interest inventories, such as the Kuder Preference Record or the Strong Vocational Interest Blank, which yielded correlations with college grades of .05 to .26. A median correlation of .13 was reported by these authors for 23 studies which used biographical and demographic variables as predictors.

The current interest in non-intellective variables should not be taken as an indication that these factors are of equal or greater value as predictors than the traditional intellective factors. The evidence is consistent that prior academic achievement and test scores are the best predictors of college success (Harris, 1940; Garrett, 1949; Fishman and Pasanella, 1960; Fishman, 1962; Mayhew, 1965). Studies which combined intellective and non-intellective predictors typically have found that the intellective variables had the highest correlation with the criterion, and the non-intellective factors added only modest gains to the prediction (Nichols, 1966; Ickes and Schell, 1967; Stroup, 1970; Sherron, 1970).

The superiority and stability of high school grades as the best single predictor of college academic performance have been noted by numerous writers. Garrett (1949) found that the median correlation of high school grades with college grades in 32 studies was .56. Fishman and Pasanella (1960) reported an average correlation of about .50 in 263 studies involving high school record and freshman grades. Giusti (1964) reviewed six summaries of the literature over three decades and reported that the median correlations of high school averages and college averages ranged from .53 to .65. Bloom and Peters (1961) attempted to improve the correlation between high school and college grade point averages by adjusting the prediction equations for individual high schools on the basis of the collegiate records of their graduates. Although an increase of .11 in median correlation was reported, similar attempts by Lindquist (1963), Watley and Merwin (1967), and Loeb and Mueller (1970) were unsuccessful.

The use of multivariate analyses in which scholastic aptitude test scores were added to measures of high school performance has resulted in modest increases over predictions which used high school grades alone. Fishman (1962), Lavin (1965), and Hills, Gladney, and Klock (1967) reported multiple correlations from .55 to .70. Fishman and Pasanella (1960) stated that the average gain in prediction obtained from adding a second intellective predictor to high school record was .11.

The literature indicates that academic prediction for males and females differs. Hills and Klock (1965) stated that separate prediction equations were appropriate for males and females based on their study of entering freshmen at a "large southern university." Two aspects of academic prediction for males and females appear to differ. First, the academic achievement of females can be predicted with greater accuracy than the achievement of males (Adkins, 1963; Cope, 1968; Munday, 1970). Second, the variables that are predictive of academic achievement for males and females tend to differ. Adkins (1963) examined the grade point averages of male and female students over a two-year period. He found that the best predictor of male grade point average was high school grades, whereas the best predictor for females was ACT mathematics score. Stroup (1970) developed separate regression equations for males and females to predict freshman grade point averages. Although several variables appeared in both equations, certain scales of the California Psychological Inventory were predictive for males only or for females only.

The unique nature of each collegiate institution as a variable in academic prediction has been described in several studies. Pace and Stern (1958) observed that each college campus had distinct intellectual and social characteristics, and that students were sensitive to institutional differences in these characteristics. The importance of compatibility between student and institutional expectations was noted by Fishman (1962) and Feder (1965). Hoyt (1968) attempted to develop a generalized regression equation for predicting academic performance in 18 colleges but he found that an individual regression constant was necessary for each college to account for institutional variations. Munday (1970) attempted to identify the factors related to variations in predictability among institutions. He found that "high-predictable" colleges were characterized by (1) a large proportion of freshmen students living under college supervision, (2) a "wide range" of freshman talent indicated by an atypically large standard deviation on ACT composite scores, (3) a freshman class of approximately 500 students or less, and (4) a mean ACT composite score "above the national average." These four factors accounted for 35 per cent of the variance in predictability among the institutions studied.

Several studies have examined the question of differences in major field or department of study as a factor in academic prediction. Hills, Gladney, and Klock (1967) reported that the research reviewed by them on this issue was inconclusive and further study was indicated. O'Donnell (1969) found significant differences in the validity of a predictive equation when it was applied to five different academic divisions in a California state college. McFaddin (1971) studied academic prediction within four upper-division colleges at the University of Florida and observed that the probability of a student achieving academic success varied with choice of college.

The research evidence concerning academic prediction for "culturally different" students has been somewhat restricted and occasionally contradictory. Munday (1965) and Cleary (1968) reported similar predictive validities for black and white students on the basis of tests of academic ability. Clarke and Ammons (1970) found that intellective predictors that were valid for white males and females had no predictive value for black males. Sampel and Seymour (1971) reported a similar finding. Bowers (1970) found significant differences in the regression equations developed for regularly admitted students and students admitted under a "Special Educational Opportunities

Program." Dispenzieri _et al_. (1971) were able to account for only 22 per cent of the variance in attempting to predict the academic success of culturally different students.

Academic prediction has proved to be a valuable aid to colleges and universities which have used selective admissions procedures to reconcile mounting enrollment pressures with limited facilities, personnel, and resources. The fact remains, however, that many problems related to predicting college achievement are unresolved. Richards, Holland, and Lutz (1967) stated that the intellective factors emphasized in most prediction formulas are ineffective in selecting students who will make outstanding contributions outside the classroom. The narrowness of current selection criteria also was criticized by Fishman (1958, 1962).

A study by Husband (1957) illustrated another shortcoming of prediction formulas limited to intellective factors. He followed the careers of 368 graduates of the 1926 graduating class from Dartmouth College 30 years after graduation and found that outstanding college achievement in any of several areas was predictive of outstanding achievement in later life. He stated:

> I would suggest, then, that one look for the man in the top quarter of his class--the top quarter in almost anything: scholarship,

> campus politics, sports, or any other extracurricular activity. Actually, it does not make much difference in what field, or fields, he made his mark . . . (p. 158)

Bradley and Sanborn (1971) argued that human behavior is not static, and the common practice of testing students near the end of their high school careers to predict college performance is restrictive. However, their attempt to predict college achievement on the basis of longitudinal high school measures was unsuccessful. Whitney and Boyd (1971) demonstrated that the efficiency of predictive measures varied with the percentage of students denied admission. A study by Holland (1958) indicated that academic prediction equations were of limited value in forecasting the college achievement of a group of high-ability National Merit Scholars. Correlations were reported in the low .20's. Humphries (1968) maintained that grade point average was an unstable criterion of academic success, and recommended that predictive measures be validated on the criterion of persistence versus withdrawal from college.

Perhaps the most conspicuous factor limiting academic prediction is the capriciousness of human behavior. Mayhew (1965) described this problem as follows:

> Students drop out of college because the first week end away from home is rainy, because of an unfortunate love affair, because of a fortunate love affair, or because of a change in family financial fortunes. They succeed or fail in courses because they like or dislike a professor, because they find social life attractive or unattractive, or because their teachers are unpredictable in their grading policies. These are all human variations; and as long as they persist, one can suspect that admissions procedures will not be much more precise than they are now. (p. 45)

Performance of the Junior College Transfer Student

One of the earliest studies of the performance of the junior college transfer student was conducted by Koos (1924). He studied 95 transfer students who enrolled in 19 colleges and universities, by comparing their junior year grades with the grades of a group of native students, and concluded that there appeared to be no appreciable difference between the two groups. A study by Martorana and Williams (1954) compared 251 junior college transfer students with a matched group of native students at the State College of Washington. The authors concluded that there were no significant differences in academic performance.

Later studies involving larger numbers of students have produced results that are somewhat less optimistic.

More than 2,500 junior college transfer students enrolled in 16 institutions were studied by Medsker (1960). The native students had higher first-semester grade point averages in 12 of the 16 institutions, and the attrition rate was lower for natives in 14 of the 16 institutions.

Perhaps the most extensive investigations of junior college transfer student performance in the literature are those reported by Knoell and Medsker (1964a, 1964b, 1965). These reports are based on a study of 7,243 junior college transfer students who transferred to 43 four-year institutions in 10 states in the fall of 1960. The transfer students were compared with a group of 3,349 native students.

The Knoell and Medsker investigations reported several indications of difficulty in the transfer students' performance. The native students, as a group, showed a steady improvement in grades as they progressed through their junior and senior years, but the transfer students suffered an abrupt drop in grades in their first term after transfer. Furthermore, 30 per cent of the transfer students earned averages below "C" during at least one term in the upper division compared with 20 per cent of the native students (1965, p. 29). It was also reported that only 45 per cent of the transfer students graduated within two years after transfer, but data on the native students' graduation rates were not provided for comparison (1964a, p. 177).

Hills (1965a) reviewed 18 studies concerned with the academic performance of tens of thousands of junior college transfer students. He concluded that the bulk of the data predicted the following for the student transferring from junior to senior college:

> . . . he can expect to have an appreciable drop in his college grades when he transfers. Probably his grades will recover at least to some extent. Second, after he transfers his grades will, more likely than not, be lower than those of the native students at the college to which he transfers. Third, as a transfer, he will be less likely to survive to graduate from the four year college than if he were a native, and it will probably take him longer than if he were a native. (1965, p. 209)

White (1967) surveyed the admissions policies for transfer students at 124 institutions and found that over one-fourth of the institutions required junior college transfer students to have greater than a 2.0 average to be eligible for admission. Hills (1965b) argued that if students were required to have a 2.0 average to graduate, junior college transfer students should be required to have a 2.7 average for admission.

A comparison of several studies indicates that the success of junior college transfer students varies with senior institutions of enrollment. Lee and Suslow (1966) noted substantial differences in performance between native and transfer students at the University of California at Berkeley. Similar differences were reported by Russell (1968) at the University of Georgia. However, Birnbaum (1965) reported equal success for native and transfer students at the City College of New York. Irvine (1966b) observed that the performance differences between these two groups at a "southeastern state university" were too small to be of practical significance. A study by Stickler (1958) revealed that the academic work of junior college transfers at Florida State University exceeded that of several groups of native students.

Knoell and Medsker (1964a, 1964b, 1965) stated that the performance of junior college transfer students varied considerably among individual institutions, types of institutions, and the states in which the institutions were located. For example, the "three-year graduation rate" for private universities varied from 32 per cent at Seattle University to 80 per cent at the University of Southern California (1965, p. 48). The highest average grades after transfer were earned by students who transferred to teacher's colleges, and the lowest grades were earned at technical institutes and major state universities (1964a, p. 81).

The highest "three-year graduation rates" were obtained in Pennsylvania (72 per cent). Comparable rates for California and Florida were 63 per cent, and for Illinois, 54 per cent (1965, p. 52). Within the state of Florida, Atwell (1968) reported variations in "two-year graduation rates" that ranged from 38.1 to 65.2 per cent in five state universities.

Many investigators have attempted to determine the sources of variance in student performance after transfer. Starr (1963) stated that transfer students faced problems that had been experienced by natives in their freshman year, such as departure from their home environment and adjustment to a complex, impersonal campus. Hanson (1965) referred to social isolation factors, emphasizing that natives had two previous years in which to establish friendships and affiliations. Webb (1971) found that the greatest single contributor to differences in pre-transfer and post-transfer grades was differential grading standards between junior and senior institutions. Knoell and Medsker (1965) reported that substantial numbers of transfer students felt that differences in grading practices had a great influence on their performance. Hartmann and Caple (1969) reported that upper-division college of enrollment was significantly related to transfer student grades at the University of Missouri.

Perhaps the most consistent sources of variation in post-transfer performance were differences in academic aptitude and prior achievement. Knoell and Medsker found that the transfer students who were most successful in senior college had strong academic records in junior college and in high school (1964a, p. 179). High school grades and college admissions test scores were identified as the best predictors of post-transfer grades in a study at the University of Washington (Lunneborg and Lunneborg, 1967). Junior college grades and Florida Twelfth Grade Test scores were cited as significant predictors of achievement for junior college transfer students in the state universities of Florida (Bashaw, 1963; Nickens, 1970a). Lambe (1964) observed that transfer students with higher junior college grades performed somewhat better than native students.

An exception to this general pattern was reported by Grover (1967), but the bulk of the evidence supports the hypothesis that intellective variables are significant predictors of post-transfer academic performance. Several studies suggest that academic aptitude may be the underlying reason for frequently reported differences between native and transfer student achievement. Fincher (1964) observed that students who entered Georgia public senior colleges as freshmen had significantly higher SAT scores than Georgia junior college students who applied for transfer to the senior institutions. Differences between native and transfer student performance have not been significant where academic aptitude has been controlled (Jones, 1966; Birnbaum, 1970; Nickens, 1970b).

As stated above, several studies have examined issues related to the academic performance of Florida public community college students who transferred to senior institutions in this state. The specific focus of each study has varied, and each has added to the emerging body of knowledge on this subject.

A study by Bashaw (1963) examined the relative effectiveness of three mathematical models in predicting the senior college performance of transfer students in three Florida universities. However, the criterion measure used was junior year grades rather than the more conclusive criterion of graduation versus withdrawal.

Cooper (1964) attempted to identify the variables which predicted whether or not Florida community college graduates would attend a senior institution after completing their associate degree. No significant differences were found between "continuers" and "non-continuers." Sims (1966) investigated the predictive power of 25 institutional characteristics of 17 community colleges in relation to the academic performance of their students in four state universities. The institutional characteristics studied were not found to be significant predictors of upper-division grades. Atwell (1968) did a similar study of community college characteristics as predictors of senior college performance. He reported that no clearly delineated set of predictors was found.

However, it appears that Atwell provided a significant insight into some probable causes of the inconclusive findings typically obtained in studies attempting to develop predictive data for several institutions concurrently. Although he found no single set of valid predictors for transfer student performance within the Florida universities which he studied, he did find significant differences in student performance based on senior institution of enrollment and major field of study.

The importance of major field of study as a variable in predicting academic success was demonstrated by McFaddin (1971). His study of student academic performance in four upper-division colleges at the University of Florida reported that choice of college affected a student's probability of success. However, his prediction equations were based on a population which included native students, junior college transfer students, and transfer students from other colleges and universities. Predictive data explicitly applicable to junior college transfer students were not provided.

Nickens (1970a) found that junior college grade point average and Florida Twelfth Grade Test scores had "practical meaning" in a general linear equation to predict transfer student grades at Florida State University. The same author (1970b) reported that differences in academic performance between native and transfer students at Florida State University were not significant when differences in academic ability were controlled. However, Nickens' findings are limited to student populations at the specific institution at which he performed his studies (Pace and Stern, 1958; Fishman, 1962; Feder, 1965; Hoyt, 1968; Munday, 1970).

Two recent studies have compared native and transfer student performance at the University of Florida (Walker, 1969; Voyles, 1971). The findings were generally consistent with results reported elsewhere in the literature. Native students, as a group, were typically more successful than transfer students on the basis of several indices, such as grade point averages, withdrawal rates, and progress toward graduation. Both studies suggested that academic aptitude, as measured by the Florida Twelfth Grade Test, was related to variations in performance (Walker, p. 44; Voyles, p. 4) but statistical analyses were not employed to confirm this.

At the present time, a systematic statistical analysis which identifies the variables most strongly related to the academic success of the Florida public community college transfer student to the University of Florida is not available. The purpose of this study was to provide a weighted combination of predictive variables which maximally differentiated between successful and unsuccessful Florida public community college transfer students at the University, based on the criterion of graduation versus suspension or academic withdrawal.

CHAPTER III

RESEARCH DESIGN AND PROCEDURES

This study was designed to investigate several independent variables which the literature suggested were related to transfer student academic performance. The independent variables, which are specified below, were limited to factors available in student records at the University of Florida.

Transfer student academic performance was traced over a time period sufficient to allow for completion of a baccalaureate degree. Under ideal conditions, the baccalaureate degree would have been completed within two academic years, of six quarters. This study traced the transfer students' academic performance for nine consecutive quarters, which included two summer quarters.

The independent variables were analyzed to determine their relative value in predicting the academic performance of the transfer students, which was the dependent variable in this study. The data analysis also provided a weighted combination of the independent variables which maximally differentiated between those students who attained their baccalaureate degrees at the University of Florida and those who were suspended from the University of Florida or who withdrew while under academic probation.

Subjects

The subjects for this study were upper-division students at the University of Florida who transferred with junior standing directly from a Florida public community college during the first three quarters of the 1968-1969 Academic Year: the Fall Quarter, 1968, the Winter Quarter, 1969, and the Spring Quarter, 1969. In addition, the subjects met one of the following criteria:

1. Within a period of nine consecutive quarters, which included two summer quarters, from their quarter of entry to the University of Florida, they received a baccalaureate degree; or
2. Within a period of nine consecutive quarters, which included two summer quarters, from their quarter of entry to the University of Florida, they were suspended from the University or withdrew while under academic probation.

A total of 858 subjects who met these criteria was identified. However, complete information on each of the independent variables was not available for each of these subjects. This resulted in the deletion of 119 subjects. In addition, nine subjects enrolled in the University's College of Pharmacy were deleted since this college required all its students to complete three years of study beyond the sophomore year to complete the baccalaureate degree. The baccalaureate degree programs of the other upper-division colleges in the University required only two years beyond the sophomore year, with the one exception of the architecture curriculum in the College of Architecture and Fine Arts. However, the other five baccalaureate curricula of this college required only two years of study beyond the sophomore year. Since the data in this study identified only college of enrollment and not major field of study, students from the College of Architecture and Fine Arts were not excluded. These deletions totaled 128 subjects, leaving 730 subjects for the study sample.

Data Collection

The data for this study were obtained from existing student records maintained by the Office of the Registrar and the Office of Student Development at the University of Florida. All the information classifications stored within these records were examined and the literature in this area of research was reviewed. The variables investigated were selected on the basis of their use in previous research and their availability in the student records maintained by the University of Florida. The data included most of the variables cited in previous research as the "best predictors" of academic performance in college.

Data on each of the following predictive variables were obtained for each subject:

1. Grade point average for community college freshman and sophomore years
2. Florida Twelfth Grade Test score or equivalent
3. Community college of origin (coded for the purpose of this study)
4. Size of community college of origin, based on full-time equivalent enrollment
5. University of Florida upper-division college in which enrolled
6. Age at beginning of junior year (in months)
7. Marital status at beginning of junior year
8. University of Florida local residence (dormitory, fraternity or sorority, campus married housing, or off-campus).

Data were also obtained on the race of each subject. However, since black students comprised less than 1 per cent of the total study sample, the variable of race was not included in the statistical analyses.

The academic record of each subject was traced for nine consecutive quarters from his term of entry at the University of Florida. This period included two summer quarters. Thus, students who entered the University in the Fall Quarter, 1968, were traced through the Fall Quarter, 1970; students who entered in the Winter Quarter, 1969, were traced through the Winter Quarter, 1971; and students who entered in the Spring Quarter, 1969, were traced through the Spring Quarter, 1971.

Data Analysis

The statistical treatment used was a stepwise discriminant analysis which utilized a computer program within the BMD Biomedical Computer Programs package (Dixon, 1968). The specific program used was BMD 07M, Stepwise Discriminant Analysis. This is an established, economical, multivariate procedure available in the College of Education Research Service Center for use with the University's IBM 360 computer.

The problem for this study was the evaluation of certain predictive factors believed to be related to transfer student academic performance, and the identification of a weighted combination of the predictive variables which maximally discriminated between two groups of transfer students. These two groups were those students who attained their baccalaureate degrees within nine consecutive quarters from their quarter of entry to the University of Florida, and those students who were suspended from the University or who withdrew from the University while under academic probation within the same period of time.

Whenever several measures are taken on two or more groups of subjects, an attempt to classify the subjects on the basis of these measures may be hampered by the overlap in their distributions. Discriminant function analysis is a procedure which develops a linear combination of the individual measures such that the amount of overlap between the groups is minimized. The measures of the individual variables are replaced by a single compounded variable which maximizes the difference between the two or more groups. The compounded variable is derived by assigning a weighted value, known as the lambda (λ) coefficient, to each independent variable in the discriminant equation. Descriptions of discriminant function analysis have been provided by Cooley and Lohnes (1962), Hoel (1962), Li (1964), and Anderson (1966).

Data for male and female students were treated separately since the literature suggests that the prediction of academic performance varies with sex in two respects. First, the academic achievement of females can be predicted more accurately than that of a males (Adkins, 1963; Cope, 1968; Munday, 1970). Second, prediction equations for males and females tend to differ, with respect to the variables included and the relative importance of those variables (Adkins, 1963; Stroup, 1970).

When a prediction system is developed for a given population, chance fluctuations in the sample used to develop the prediction system may tend to spuriously increase the estimated accuracy of prediction. To avoid this effect, the prediction equations derived from one sample drawn from a population must be cross-validated on a second sample of subjects from the same population (Helmstadter, 1970).

Therefore, the subjects in this study were divided into four samples, two of males and two of females. Subjects within each sample were chosen by random selection procedures. The composition of the samples is shown in Table 2. The first sample of males and the first sample of females were used in the discriminant function analysis

TABLE 2

COMPOSITION OF FOUR SAMPLES, BASED ON SEX AND ACADEMIC PERFORMANCE

Sample	Sex	Received Baccalaureate Degree	Suspended or Withdrew	Total Sample
Initial	Male	138	76	214
Initial	Female	123	29	152
Cross-Validation	Male	138	75	213
Cross-Validation	Female	123	28	151
				730

described above. The prediction equations derived from the discriminant function analysis were then applied to the second sample of each sex to cross-validate the initial findings. A test for significance of the difference between two independent proportions (Ferguson, 1966) was used to compare the results of the initial analysis and the cross-validation procedure.

It should be noted that two of the independent variables specified above, "community college of origin" and "University of Florida upper-division college in which enrolled," were not included in the discriminant function analysis. The inclusion of these variables would have required the addition of 36 independent variables to the analysis, or a total of 42 independent variables. The number of subjects in this study (n = 730) was too small to permit a statistically meaningful analysis with this many variables. Therefore, the relationship of "community college of origin" and "University of Florida upper-division college in which enrolled" to transfer student academic performance was analyzed by a chi square test. Each chi square test provided a measure of association between the independent variable and transfer student academic performance.

CHAPTER IV

ANALYSIS OF THE DATA

Stepwise Discriminant Analysis

The initial statistical treatment was a stepwise discriminant analysis which utilized the BMD 07M computer program. Separate analyses were performed for males and females. The male sample for the initial analysis consisted of 138 subjects who received a baccalaureate degree and 76 subjects who were suspended or who withdrew, a total of 214 males. The female sample for the initial analysis consisted of 123 subjects who received a baccalaureate degree and 29 subjects who were suspended or who withdrew, a total of 152 females.

The computer program performed a multiple discriminant analysis in a stepwise manner. At each step one variable was selected and entered into the set of discriminating variables. The variable selected at each step was the one which provided the greatest improvement in classification between the students who obtained their degrees and the students who were suspended or who withdrew.

The variable entered was selected by the first of the following equivalent criteria:

1. The variable which had the largest F value.
2. The variable which when partialed on the previously entered variables had the highest multiple correlation with the groups.
3. The variable which gave the greatest decrease in the ratio of within to total generalized variances.

A complete description of this program has been provided by Dixon (1968, p. 214a-214b).

The analysis of the data led to the construction of two prediction equations for the male subjects and two for the female subjects. Each pair of equations consisted of one for predicting completion of a degree and one for predicting withdrawal. Values were calculated for both completion of a degree and withdrawal for each subject. The subject was classified into the degree group or the withdrawal group on the basis of the smaller value derived from the application of the pair of equations.

Male Transfer Students

The prediction equations developed by the stepwise discriminant analysis consisted of a constant term and a lambda coefficient (λ) for each of the independent variables.

The equations developed for the male transfer students were as follows:

$$DG = -83.59131 + 14.62336\ (X_1) + 0.04242\ (X_2) + 0.36315\ (X_3) + 0.37498\ (X_4) - 1.67783\ (X_5) + 3.30458\ (X_6)$$

$$WD = -76.48125 + 12.75177\ (X_1) + 0.04341\ (X_2) + 0.30981\ (X_3) + 0.37219\ (X_4) - 2.82078\ (X_5) + 3.07564\ (X_6)$$

where:

DG = Completion of a baccalaureate degree

WD = Withdrawal under academic probation or suspension

X_1 = Grade point average for community college freshman and sophomore years

X_2 = Florida Twelfth Grade Test score or equivalent

X_3 = Size of community college of origin, based on full-time equivalent enrollment

X_4 = Age at beginning of junior year (in months)

X_5 = Marital status at beginning of junior year

X_6 = University of Florida local residence (dormitory, fraternity, campus married housing, or off-campus).

The independent variables were entered into the discriminant analysis in a stepwise fashion. The variable entered at each step was the one which provided the greatest improvement in classification. Table 3 shows the order in which the variables were entered, and the F ratio calculated for each variable as it was entered into the discriminant function.

An examination of Table 3 indicates that the individual F ratios for the first three variables entered were statistically significant, whereas the individual F ratios for the other three variables were not. The first variable entered, grade point average, accounted for the greatest discriminating power. However, when the discriminating effect of grade point average was accounted for in the function, marital status continued to significantly differentiate between the degree group and the withdrawal group. With both grade point average and marital status accounted for in the function, size of community college continued to significantly differentiate between the two groups. After these three variables were entered into the discriminant function, the discriminating power of the other variables was marginal. It should be noted, however, that the cumulative approximate F ratio calculated after all six variables were entered was 7.77 (df = 6,207), which is statistically significant at the .01 level.

By analyzing the means of the independent variables and the univariate F ratios calculated for these variables

TABLE 3

INCLUSION OF VARIABLES, BY STEP, MALE TRANSFER STUDENTS

Step	Variable Entered	F Ratio at Entry
1	X_1, Grade point average for community college freshman and sophomore years	23.17**
2	X_5, Marital status at beginning of junior year	13.12**
3	X_3, Size of community college of origin, based on full-time equivalent enrollment	5.11*
4	X_6, University of Florida local residence (dormitory, fraternity, campus married housing, or off-campus)	2.59
5	X_2, Florida Twelfth Grade Test score or equivalent	0.36
6	X_4, Age at beginning of junior year (in months)	0.21

**$p < .01$
*$p < .05$

without reference to their order of entry into the discriminant function, it is possible to discuss the differences between the degree group and the withdrawal group from another perspective. Significant univariate F ratios were obtained for the same three variables described above. Thus, on a multivariate basis or on a univariate basis, the data suggest the following: The students who obtained a degree tended to have higher transfer grade point averages than the students who withdrew. Married students were more likely to obtain a degree than single students. Students in the degree group tended to come from somewhat larger community colleges.

Differences between the degree group and the withdrawal group for the remaining variables were not significant. There was virtually no difference between the groups on the variable of University of Florida local residence. The data provide some indication that the degree group tended to score slightly higher on the Florida Twelfth Grade Test and that the degree group tended to be slightly older.

An important characteristic of any prediction system is the accuracy of prediction. The prediction equations developed for the male transfer students correctly classified 62.3 per cent of the students who obtained degrees and

76.3 per cent of the students who withdrew. The combined prediction accuracy of the pair of equations for the total sample was 67.3 per cent. These data are shown in Table 4.

TABLE 4

COMPARISON OF ACTUAL GROUP MEMBERSHIP WITH PREDICTED GROUP MEMBERSHIP, INITIAL ANALYSIS, MALE TRANSFER STUDENTS

Actual Group Membership		Predicted Group Membership		Per Cent Correctly Classified
		Degree	Withdrawal	
Degree	138	86	52	62.3
Withdrawal	76	18	58	76.3
Total Correct	214	86	58	67.3

The cross-validation procedure for the male transfer students is discussed in the following section.

Cross-Validation

The cross-validation sample for the male transfer students consisted of 138 subjects who received a baccalaureate degree and 75 subjects who were suspended or who withdrew, a total of 213 subjects. The prediction equations derived from the discriminant function analysis were applied to this sample.

The cross-validation procedure correctly classified 65.2 per cent of the students who obtained degrees and 64.0 per cent of the students who withdrew. The combined prediction accuracy for the total cross-validation sample was 64.8 per cent. These data are shown in Table 5.

TABLE 5

COMPARISON OF ACTUAL GROUP MEMBERSHIP WITH PREDICTED GROUP MEMBERSHIP, CROSS-VALIDATION, MALE TRANSFER STUDENTS

Actual Group Membership		Predicted Group Membership		Per Cent Correctly Classified
		Degree	Withdrawal	
Degree	138	90	48	65.2
Withdrawal	75	27	48	64.0
Total Correct	213	90	48	64.8

Two independent samples were drawn from the population of male transfer students. A classification procedure which used the same prediction equations was applied to both samples. The proportion of students correctly classified in the initial sample and the cross-validation sample differed. Are these differences statistically significant? An affirmative answer to this question would suggest that the accuracy of classification had been affected by chance factors operating in the sampling procedure.

This question was examined by using a test for significance of the difference between two independent proportions. This test calculates a z value by dividing the observed differences between two proportions by an estimate of the standard error of the difference between the proportions. For a full discussion of this procedure refer to Ferguson (1966, pp. 176-178). The results of these tests are shown in Table 6.

TABLE 6

COMPARISON OF PROPORTIONS OF STUDENTS CORRECTLY CLASSIFIED IN INITIAL SAMPLE AND CROSS-VALIDATION SAMPLE, MALE TRANSFER STUDENTS

Student Group	Proportion Correctly Classified		
	Initial Sample	Cross-Validation Sample	z
Degree Group	.62319	.65217	.50
Withdrawal Group	.76316	.64000	1.66
Total Sample	.67290	.64789	.55

Since the z statistic requires values of 1.96 and 2.58 for significance at the .05 and .01 levels, it is unlikely that the accuracy of the prediction equations developed in the initial analysis was spuriously increased by chance factors operating in the initial sample.

Female Transfer Students

The prediction equations developed by the BMD 07M computer program for the female transfer students were as follows:

$$DG = -52.21213 + 14.54992\ (X_1) + 0.01128\ (X_2) + 0.63396\ (X_3) + 0.17088\ (X_4) - 5.56320\ (X_5) + 1.89898\ (X_6)$$

$$WD = -46.26201 + 13.01085\ (X_1) + 0.00837\ (X_2) + 0.60280\ (X_3) + 0.17199\ (X_4) -6.05875\ (X_5) + 1.69787\ (X_6)$$

where:

DG = Completion of a baccalaureate degree

WD = Withdrawal under academic probation or suspension

X_1 = Grade point average for community college freshman and sophomore years

X_2 = Florida Twelfth Grade Test score or equivalent

X_3 = Size of community college of origin, based on full-time equivalent enrollment

X_4 = Age at beginning of junior year (in months)

X_5 = Marital status at beginning of junior year

X_6 = University of Florida local residence (dormitory, sorority, campus married housing, or off-campus).

Table 7 shows the order in which the independent variables were entered into the stepwise discriminant analysis and the F ratio calculated for each variable as the variable was entered into the analysis.

An examination of Table 7 indicates that only the F ratio calculated for the first variable entered was statistically significant. This suggests that the relative discriminating power of the variables entered after step one was slight since the individual F ratios calculated for each variable dropped sharply after step one. After all six variables were entered the cumulative approximate F ratio was calculated as 2.84 (df = 6,145), which is statistically significant at the .05 level.

An examination of the means of the independent variables and the univariate F ratios calculated for these variables reveals the following differences between the degree group and the withdrawal group. Like the male transfer students, the females in the degree group tended to have significantly higher transfer grade point averages than the females who withdrew. A significant univariate F ratio ($p < .05$) was calculated for the variable of Florida Twelfth Grade Test score or equivalent. Females in the degree group tended to score higher than females who withdrew. Since this variable was not significant on a

TABLE 7

INCLUSION OF VARIABLES, BY STEP, FEMALE TRANSFER STUDENTS

Step	Variable Entered	F Ratio at Entry
1	X_1, Grade point average for community college freshman and sophomore years	13.81**
2	X_6, University of Florida local residence (dormitory, sorority, campus married housing or off-campus)	1.45
3	X_2, Florida Twelfth Grade Test score or equivalent	0.85
4	X_3, Size of community college of origin, based on full-time equivalent enrollment	0.49
5	X_5, Marital status at beginning of junior year	0.60
6	X_4, Age at beginning of junior year (in months)	0.03

$^{**}p < .01$

multivariate basis after grade point average had entered the discriminant function, it may be assumed that the variance accounted for by the test was already accounted for by grade point average in the function.

Differences between the degree group and the withdrawal group for the remaining variables were not significant. There was virtually no difference between the groups on the variable of community college size. Differences in marital status and local residence were negligible. The data suggest that the degree group tended to be slightly older than the withdrawal group.

The prediction equations for the female transfer students correctly classified 65.0 per cent of the students who obtained degrees and 68.9 per cent of the students who withdrew. The combined prediction accuracy of the pair of equations for the total sample was 65.8 per cent. These data are shown in Table 8.

TABLE 8

COMPARISON OF ACTUAL GROUP MEMBERSHIP WITH PREDICTED GROUP MEMBERSHIP, INITIAL ANALYSIS, FEMALE TRANSFER STUDENTS

Actual Group Membership		Predicted Group Membership		Per Cent Correctly Classified
		Degree	Withdrawal	
Degree	123	80	43	65.0
Withdrawal	29	9	20	68.9
Total Correct	152	80	20	65.8

Cross-Validation

The cross-validation sample for the female transfer students consisted of 123 subjects who received a baccalaureate degree and 28 subjects who were suspended or who withdrew, a total of 151 subjects. The prediction equations derived from the discriminant function analysis were applied to this sample.

The cross-validation procedure correctly classified 64.2 per cent of the students who obtained degrees and 71.4 per cent of the students who withdrew. The combined prediction accuracy for total cross-validation sample was 65.6 per cent. These data are shown in Table 9.

TABLE 9

COMPARISON OF ACTUAL GROUP MEMBERSHIP WITH PREDICTED GROUP MEMBERSHIP, CROSS-VALIDATION, FEMALE TRANSFER STUDENTS

Actual Group Membership		Predicted Group Membership		Per Cent Correctly Classified
		Degree	Withdrawal	
Degree	123	79	44	64.2
Withdrawal	28	8	20	71.4
Total Correct	151	79	20	65.6

A test for significance of the difference between two independent proportions was used to compare the prediction accuracy of the initial analysis with the cross-validation procedure. The results are shown in Table 10.

TABLE 10

COMPARISON OF PROPORTIONS OF STUDENTS CORRECTLY CLASSIFIED IN INITIAL SAMPLE AND CROSS-VALIDATION SAMPLE, FEMALE TRANSFER STUDENTS

Student Group	Proportion Correctly Classified		
	Initial Sample	Cross-Validation Sample	*z*
Degree Group	.65041	.64228	.13
Withdrawal Group	.68966	.71429	.20
Total Sample	.65789	.65563	.04

Since the z values were not significant, it is unlikely that the prediction accuracy of the equations developed for the female students was biased by chance factors operating in the initial sample.

Other Analyses

It was noted in Chapter III that two of the independent variables investigated in this study were not included in the discriminant function analysis. These were "community college of origin" and "University of Florida upper-division college in which enrolled." The question to be answered for each of these variables was: Is the variable associated with transfer student academic performance, or are the variable and transfer student academic performance independent? The chi square test was used to examine this question.

Separate analyses were performed for males and females. The total number of students in the study sample for each sex was used to derive the expected frequencies for each sex in the degree group and the withdrawal group.

The variable "community college of origin" was examined first. The minimum expected frequency for each cell included in the analyses was set at five. This limited the analysis for males to 14 community colleges and the analysis for females to five community colleges.

The results of the chi square analyses for community college of origin are shown in Tables 11 and 12.

The chi square tests indicate a significant relationship between the academic performance of male transfer students and community college of origin, but no significant relationship for females. These data suggest that the academic performance of the males may be related to the community college they attend prior to transferring to the University, but community college of origin does not appear to be related to the academic performance of the females. This implies a possible community college by sex interaction, at least for the community colleges included in the analyses. These data should be interpreted with caution due to the limited number of community colleges included.

The relationship of "University of Florida upper-division college of enrollment" to academic performance was also analyzed by the chi square test. A sufficient number of subjects was available for only seven upper-division colleges for the males and only three upper-division colleges for the females. The results of the analyses are shown in Tables 13 and 14.

TABLE 11

ACADEMIC PERFORMANCE OF MALE TRANSFER STUDENTS BY SELECTED COMMUNITY COLLEGES

Academic Performance	Community College														Proportion of Total Study Sample in Each Group
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
Obtained Degree	18	12	17	7	11	16	7	16	65	19	17	29	14	5	.64
Withdrew or Suspended	8	11	4	6	4	10	9	3	25	12	10	11	7	13	.36
Total	26	23	21	13	15	26	16	19	90	31	27	40	21	18	X^2 = 26.19*

*$p < .05$ (df = 13)

TABLE 12

ACADEMIC PERFORMANCE OF FEMALE TRANSFER STUDENTS BY SELECTED COMMUNITY COLLEGES

Academic Performance	Community College					Proportion of Total Study Sample in Each Group
	A	B	C	D	E	
Obtained Degree	25	49	18	47	16	.81
Withdrew or Suspended	4	13	6	7	7	.19
Total	29	62	24	54	23	X^2 = 4.40 (n.s.)

(df = 4)

TABLE 13

ACADEMIC PERFORMANCE OF MALE TRANSFER STUDENTS BY SELECTED UNIVERSITY OF FLORIDA UPPER-DIVISION COLLEGES

Academic Performance	Upper-Division College							Proportion of Total Study Sample in Each Group
	AG	AR	AS	BA	ED	EG	JM	
Obtained Degree	27	18	89	55	20	28	23	.64
Withdrew or Suspended	7	5	51	31	9	29	11	.36
Total	34	23	140	86	29	57	34	$X^2=11.55$ (n.s.) (df = 6)

College Codes:
AG = Agriculture
AR = Architecture and Fine Arts
AS = Arts and Sciences
BA = Business Administration
ED = Education
EG = Engineering
JM - Journalism and Communications

TABLE 14

ACADEMIC PERFORMANCE OF FEMALE TRANSFER STUDENTS BY SELECTED UNIVERSITY OF FLORIDA UPPER-DIVISION COLLEGES

Academic Performance	Upper-Division College			Proportion of Total Study Sample in Each Group
	AS	ED	PE	
Obtained Degree	37	154	15	.81
Withdrew or Suspended	16	26	4	.19
Total	53	180	19	$X^2 = 6.91$* (df = 2)

*$p < .05$

College Codes:
AS = Arts and Sciences
ED = Education
PE = Physical Education, Health, and Recreation

The chi square tests indicate no significant relationship between the academic performance of male transfer students and University of Florida upper-division college; however, a significant relationship was found for the females. This suggests that choice of upper-division college may be related to the academic performance of the female transfer students but not the males. An upper-division college by sex interaction is suggested for the colleges included in the analyses. These findings should also be regarded tentatively, due to the limited number of University of Florida upper-division colleges included in the analyses.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary of Findings

This study investigated the relationship of eight variables to the academic performance of transfer students from Florida public community colleges to the University of Florida. Data for male and female students were treated separately.

The relationship of six of the variables to transfer student academic performance was analyzed by a stepwise discriminant analysis which used the BMD 07M computer program. The computer program developed sets of equations for predicting either (1) completion of a baccalaureate degree or (2) suspension from the University or withdrawal while under academic probation. At each step in the computer program the variable entered was the one which provided the greatest improvement in classification between the students who completed degrees and the students who withdrew or were suspended.

The prediction equations for the male transfer students included the variables in the following order:

1. Grade point average for community college freshman and sophomore years.
2. Marital status at beginning of junior year
3. Size of community college of origin based on full-time equivalent enrollment
4. University of Florida local residence (dormitory, fraternity, campus married housing, or off-campus)
5. Florida Twelfth Grade Test score or equivalent
6. Age at beginning of junior year (in months).

The prediction equations for the female transfer students included the variables in the following order:

1. Grade point average for community college freshman and sophomore years
2. University of Florida local residence (dormitory, sorority, married housing, or off-campus)
3. Florida Twelfth Grade Test score or equivalent
4. Size of community college of origin based on full-time equivalent enrollment
5. Marital status at beginning of junior year
6. Age at beginning of junior year.

For the male transfer students, the first three variables were statistically significant as they entered the discriminant equations. For the female transfer students, only the first variable was significant as it entered the equations.

The prediction equations for the males correctly classified 67.3 per cent of the male subjects in the initial sample and 64.8 of the male subjects in the cross-validation sample. The prediction equations for the females correctly classified 65.8 per cent of the female subjects in the initial sample and 65.6 per cent of the female subjects in the cross-validation sample. The differences in the per cent of correct classifications for the initial samples and the cross-validation samples were not significant for the males or the females. This suggests that the accuracy of the prediction equations was not biased by chance factors operating in the sampling procedure.

The two variables not included in the stepwise discriminant analysis were "community college of origin" and "University of Florida upper division college of enrollment." The relationship of each of these variables to transfer student academic performance was analyzed by a chi square test. The results suggested that community college of origin seemed to be related to the academic performance of male transfer students. Conversely, University of Florida upper-division college of enrollment appeared to be related to the academic performance of female transfer students.

Conclusions

The findings obtained suggest the conclusions specified below:

1. The prediction equations developed in this study indicated that the single most powerful predictor of academic performance for both male and female transfer students was grade point average earned at the community college prior to transfer to the University.

2. The cumulative F ratios calculated for the prediction equations for both males and females were statistically significant, but the practical significance of the multivariate equations is open to question. Each pair of equations correctly classified approximately 66 per cent of the subjects. Step one of the discriminant function analysis, which classified the subjects on the basis of community college grade point average alone, correctly classified 63.6 per cent of the males and 63.8 per cent of the females. The minimal gains in prediction accuracy accomplished by adding the five other variables would not appear to justify their inclusion in the prediction system.

3. The results of this study lend some support to the use of separate prediction equations for male and female Florida public community college transfer students. However, the differences between the prediction systems for the sexes were not as great as in other studies reported in the literature (Adkins, 1963; Cope, 1968; Munday, 1970). Differences did occur by sex in the order in which some independent variables entered the equations and in the relative predictive power of the variables. However, the accuracy of prediction was approximately equal for each sex, on the basis of the multivariate equations and on the basis of classification by community college grade point average alone. It should be noted that although community college grade point average was the strongest predictor for both sexes, the prediction equations for males and females using this variable differed in lambda values and constant terms.

4. The data suggest that community college of origin appears to be related to the academic performance of male transfer students but not to females. The variable of community college size was statistically significant in the stepwise discriminant analysis for males, on the basis of both univariate and multivariate F ratios. This variable

was not significant in the discriminant analysis for females. Furthermore, the chi square tests which examined the relationship of community of origin to academic performance yielded statistically significant results for males, but not for females.

5. There is some indication that upper-division college of enrollment may be significantly related to the academic performance of female transfer students, but not males. However, since the number of upper-division colleges included in these analyses was limited this conclusion must be regarded tentatively.

Further Research

This study indicates that a student's prior academic performance at a Florida public community college is significantly related to the student's academic performance at the University of Florida. This single variable, community college grade point average, has been found to be the best predictor of academic performance after transfer for both male and female students in this study. The data, however, suggest several interesting questions which should be examined in subsequent investigations.

The question of the influence of the specific community college at which a student does his lower-division work should be explored further. Chi square tests which included limited numbers of community colleges were performed in this study. The results suggested that community college of origin was significantly related to the academic performance of males but not females, at least for the colleges included in the analyses. This question should be examined further, using larger numbers of students and a more inclusive representation of the Florida public community colleges. The subsequent analyses should control for the variable of grade point average of the subjects to determine if this factor biased the findings reported here.

Similar covariate analyses should be attempted to examine the relationship of upper-division college of enrollment to transfer student performance, with grade point average controlled. A more inclusive representation of the upper-division colleges would be desirable to increase the generalizability of the findings suggested in this study.

The variable of race was not amenable to analysis in this study due to the small number of black students in the study sample. This variable should be examined in future studies as the racial composition of the University's student body becomes more diverse.

While additional research on the issues related to the prediction of academic success for community college transfer students is needed, the limitations of these investigations should be emphasized. Prediction systems are valuable in providing information to potential students, counselors, and admissions officers. However, the literature indicates that academic prediction is far from perfect. The findings of prediction studies should be considered as an aid in decision making, not as a substitute for professional judgment.

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BIOGRAPHICAL SKETCH

Michael Jay Sitzman was born May 2, 1937, at Brooklyn, New York. He attended elementary schools in Brooklyn and in Shamokin, Pennsylvania. He graduated from Coal Township High School in Shamokin in 1955. He received the Bachelor of Science degree in business administration from Pennsylvania State University in 1959.

He served as an officer in the United States Air Force at Eglin Air Force Base, Florida, from 1959 to 1962. Upon release from military service he returned to the northeastern United States and worked in retail merchandising and sales. He returned to Fort Walton Beach, Florida, in 1963 as a contract negotiator for the federal government.

He entered the Graduate School of the University of Florida in 1968. He received the Master of Education degree in 1971 with a major in junior college counseling and guidance. Since that date he has been studying toward the Doctor of Philosophy degree in counselor education with an emphasis on student personnel administration. In September, 1971, he accepted an interim appointment as an Admissions Officer at the University of Florida while he completed his doctoral studies.

Michael Jay Sitzman is married to the former Betty Lou Prassel. They have one son, Jonathan.

He is a member of the American Personnel and Guidance Association, the American College Personnel Association, and the National Association of Student Personnel Administrators.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Robert O. Stripling

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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